Attachment 7

Stormwater Flood Management Grant Proposal
Santa Barbara County Flood and Water Conservation District
Technical Justification

Attachment 7 consists of the following items:

- ✓ **Technical Justification.** Attachment 7 provides the technical justification for the proposed project.
- ✓ **Supporting Documentation.** Technical reports, feasibility studies, and other documents justifying the claimed physical benefits are included in this attachment.

Project Overview

Lower Mission Creek presents a serious flood risk to the City of Santa Barbara's residents. Over the past century, there have been no less that 20 devastating flood events. Hence, the City of Santa Barbara, the USACE, and the SBCFCWCD have spent two decades studying and developing the *Lower Mission Creek Flood Control and Restoration Project*. The overall project would improve 1.3 miles along Mission Creek. The SBCFCWCD is submitting this grant application to fund the following 2 projects on Lower Mission Creek: Reach 1A Phase 2 (230 feet) and Reach 1B (420 feet), both of which will significantly increase the conveyance flood capacity of the channel from a 5-year event to a 20-year event and directly remove 11 parcels from the floodplain. The projects also provide restoration and habitat benefits which will increase water quality, improve riparian habitat, and facilitate the migration of steelhead and tidewater goby.

Project Physical Benefits

The *Lower Mission Creek Flood Control and Restoration Project* Reach 1A Phase 2 and Reach 1B have been specifically designed to reduce flood damage to adjacent residents and businesses, improve public safety during storm events by reduction in bank overflow, improving fish passage for federally endangered steelhead trout and endangered tidewater goby, improve riparian habitat and create extended habitat zones and improve water quality. The following bullet list summarizes the physical benefits being claimed by the projects, which are:

- Flood damage reduction for residential property (structures and contents), commercial property (structures and contents), and roads
- Avoided indirect costs, including emergency response, and disruption to employment, commerce, transportation, and communications

- Habitat restoration and fish passage
- Water quality improvement

These are described in greater detail in the sections below.

Description of Expected Physical Benefits

Historical Conditions

Historical flooding in Lower Mission Creek dates back to 1862 and since the 1900's, there are been no less that 20 devastating floods that have impacted City residents and businesses. The most significant recent floods occurred successively in January and February 1995. The damages from those flood events include damages to structures and contents. In the 2004 USACE Economic Appendix, the USACE estimated the January 1995 event to have produced $13,298,000 in damage and the March 1995 event to have produced $6,168,000 in damage. The update of historical damages was based on price indexes in the Civil Works Construction Cost Indexes System.

Table 7-1 below provides a summary of the benefits for project.

Table 7-1: Summary of Benefits

Type of Physical Benefit	Unit	Benefit	Location of Technical Justification of Physical Benefit
Flood Damage Reduction	CFS, Return Period	Increase from 1,500 cfs to 3,400 cfs	US Army Corps of Engineers Feasibility Study (2000) US Army Corps Design Documentation Report (2010)
Increased Habitat	Acres	4,000 of riparian and natively vegetated habitat zones and 10,000 sq. ft. of aquatic habitat for endangered steelhead and endangered tidewater goby	US Army Corps of Engineers EIS/EIR (2000)
Water Quality	N/A	Improved water quality in the creek.	US Army Corps of Engineers EIS/EIR (2000)

Figure 7-1: Flooding Photos

1995 Flood UPRR

1995 Flood UPRR

Without-Project Conditions

According to the USACE studies, the Lower Mission Creek currently has the capacity to convey 1,500 cfs or flood flow conveyance of a 5-year storm event. This is woefully inadequate.

Relationship of Project to Other Projects Included in the Proposal

The Reach 1A Phase 2 project restores 230 feet of the creek from Mason Street downstream to the pedestrian bride north of State Street. The channel will be widened to 55 feet at the top of bank and both banks will have an average depth of 11 feet. The invert slope of the channel will be streamlined and vegetated and excavation of up to 1 foot of streambed will occur.

The Reach 1B project provides for the rehabilitation and reconstruction of 420 feet of the creek from Mason Street to Yanonali Street. Reach 1A Phase 2 is directly downstream of Reach 1B and provides continuity in expansion of the creek channel to accommodate 25-year flood flows. Habitat and fish passage improvements in Reaches 1A Phase 2 and Reach 1B provide 4,000 sq. ft. feet of riparian habitat and habitat expansion zone and 10,000 sq, ft. (creek feet) of aquatic habitat for endangered steelhead and endangered tidewater goby.

Methods Used to Estimate Benefits

The hydrology and hydraulics of Mission Creek were studied by the USACE and the results published in the Feasibility Study Technical Appendices (September 2000). The biological resources and impacts to these were studied and published in the USACE Final Lower Mission Creek EIS/EIR (September 2000). Water quality is also discussed in this document.

Benefit estimates and supporting data are drawn from the USACE economic analysis for the project (U.S. Army Corps of Engineers, 2004).

Flood damages for the without- and with-project conditions were calculated with the HEC's Flood Damage Reduction Analysis (HEC-FDA) model. Expected annual damages (EAD) were calculated with HEC's Expected Annual Damage (EAD) model.

DWR's F-RAM model was used to estimate expected annual damages to roads for the without- and with-project conditions.

Flood Damage Reduction

The USACE economic assessment is formulated to be in accordance with USACE Planning Guidance Notebook guidelines for flood damage reduction estimation (U.S. Army Corps of Engineers, April 2000). Flood damages for the without- and with-project conditions were calculated with the HEC's Flood Damage Reduction Analysis (HEC-FDA) model. Expected annual damages (EAD) were calculated with HEC's Expected Annual Damage (EAD) model.

The USACE economic analysis did not calculate expected annual damages to roads for the without- and with project conditions. However, in past flood events – particularly in 1995 and 1998 – roads incurred extensive damage and cleanup costs due to flooding. DWR's F-RAM model was used to estimate expected annual damages to roads for the without- and with-project conditions. F-RAM damage estimates are based on miles of inundated roads in Table 7-2 and 7-3 below. Linear miles of impacted roads were calculated in AutoCAD and GIS for the Lower Mission Creek floodplain without- and with-project. Separate estimates were developed for arterial, major, and minor roads, per F-RAM input requirements.

Emergency Response/Cleanup Costs

Emergency Response/cleanup costs include evacuation and re-occupation of the floodplain, flood fighting, disaster relief and increases in normal operations of police, fire, medical, governmental and industry activity. Clean-up costs include the costs of removing and disposing sediment that covered the streets, parking lots, and public property. USACE emergency response/cleanup cost estimates are based on data from City of Santa Barbara on costs incurred in the 1995 flood events. Estimated emergency response/cleanup costs by storm magnitude for the no-project condition are summarized in Table 7-4.

Table 7-4
Emergency Response & Cleanup Costs by Storm Magnitude
('000 2012 Dollars)

Storm Magnitude	Emergency/Cleanup Cost
9-yr	$360
55-yr	$2,158
100-yr	$3,099
500-yr	$5,612

Source: (U.S. Army Corps of Engineers, 2004), Table E18. Dollar values updated to 2012 with the composite price index in the USACE Civil Works Construction Cost Indexes System (CWCCIS).

Habitat Restoration and Fish Passage

The projects will provide habitat restoration benefits in the form of re-vegetated creek banks and habitat expansion areas. The creek will vegetated banks. Habitat restoration will involve planting of native trees, placement of topsoil and groundcover, use of erosion control blankets, and planting with riparian shrub species. In addition, a habitat expansion area will also be created with native trees and shrubs. In sum, 4,000 square feet of creek bank restoration and habitat expansion area will created (Project plans).

Furthermore, the fish baffles and fish ledges will also be provided along the channel walls to facilitate the passage of endangered steelhead trout and tidewater goby. With the

expansion of the creek channel, the aquatic habitat for fish would increase by a total 10,000 square feet (Project plans).

Water Quality

New Facilities Required to Achieve Benefit

No new facilities, policies or actions will be required to obtain the physical benefits. Improvement of the existing facility by widening the creek channel and providing habitat areas will create an environment that will obtain the physical benefits.

Uncertainty of Benefits

Uncertainties related to the success of this project may include:

- climate change may bring fewer and/or more extreme flood events to the region;
- financial constraints may reduce the partnering agencies ability to follow through with the project;
- the anadromous fish population may decline due to other factors and not utilize the habitat restoration improvements.

Potential Adverse Physical Effects

An EIR/EIS was prepared for the project in 2000 and a Mitigation and Monitoring Program was developed (as is appended to this application). Due to the nature of the project, construction will be initiated within the creek channel which will create temporary impacts to stream bank habitat, aquatic habitat, and any wildlife present in the immediate area. All permit requirements levied by the regulatory and wildlife agencies will be adhered to.

One commercial structure associated with Reach 1A Phase2 will need to be demolished. These are all addressed in the MMP for the project.

Annual Project Physical Benefits

The following tables present the physically quantifiable benefits for the project. One table is completed for each physically quantifiable benefit.

Flood Reduction

The table 7-6 below provides information regarding the annual physical benefit for flood reduction with and without the project.

Table 7-6 Flood Reduction

Physical Benefit: Flood Reduction			
Year	**Physical Benefits**		
	Without Project[1]	**With Project[2]**	**Difference**
2012	1,500 cfs	3,400 cfs	1,900 cfs
2013	1,500 cfs	3,400 cfs	1,900 cfs
2014	1,500 cfs	3,400 cfs	1,900 cfs
Last Year of (50 year) Project Life	1,500 cfs	3,400 cfs	1,900 cfs
List supporting sources and references: USACE Feasibility Study, September 2000			

Flood Damages

USACE completed site surveys of the floodplain in 1997 and 2004 to estimate depreciated replacement value of structures in the floodplain. The structure values were based on information provided by Santa Barbara County's Clerk-Recorder Assessor Office and construction costs from Marshall & Swift. USACE structure and contents value estimates are summarized in Table 7-7. Residential content values are based on content to structure ratios for residential structures derived from the 1997 survey data. The survey estimated the residential content to structure value to be 64.3 percent. Commercial structure content values are based on either an expert panel that was conducted in Houma, Louisiana (1997) or data from the survey of commercial structures in the Lower Mission Creek Floodplain (1997).

Flood Damages – Structures and Contents

Physical Benefit: Structures and Contents			
Year	**Physical Benefits**		
	Without Project[3]	**With Project[4]**	**Difference**
2012	$1,049,000	$487,000	$562,000
2013	$1,049,000	$487,000	$562,000
2014	$1,049,000	$487,000	$562,000
Last Year of (50 year) Project Life	$1,049,000	$487,000	$562,000
List supporting sources and references: USACE Feasibility Study, September 2000			

Flood Damages -- Roads

Physical Benefit: Roads			
Year	**Physical Benefits**		
	Without Project	**With Project**	**Difference**
2012	$840,000	$550,000	$290,000
2013	$840,000	$550,000	$290,000
2014	$840,000	$550,000	$290,000
Last Year of (50 Year Project) Project Life	$840,000	$550,000	$290,000
List supporting sources and references: Construction plans			

Habitat Restoration and Fish Passage

The table below provides information regarding the annual physical benefit for habitat restoration with and without the project.

Physical Benefit: Habitat Restoration and Fish Passage			
Year	**Physical Benefits**		
	Without Project	**With Project**	**Difference**
2012	0 acres (habitat) 22,200 sq. ft. (fish passage)	0.09 acres (habitat) 32,000 sq. ft. (fish passage)	0.09 acres (habitat) 10,000 sq. ft.
2013	0 acres (habitat) 22,200 sq. ft. (fish passage)	0.09 acres (habitat) 32,000 sq. ft. (fish passage)	0.09 acres (habitat) 10,000 sq. ft.
2014	0 acres (habitat) 22,200 sq. ft. (fish passage)	0.09 acres (habitat) 32,000 sq. ft. (fish passage)	0.09 acres (habitat) 10,000 sq. ft.
Last Year of (50 Year Project) Project Life	0 acres (habitat) 22,200 sq. ft. (fish passage)	0.09 acres (habitat) 32,000 sq. ft. (fish passage)	0.09 acres (habitat) 10,000 sq. ft.
List supporting sources and references: Construction plans			

Water Quality Improvement

Water quality is a benefit that is difficult to quantify, but water testing will be conducted regularly during and after construction and results will be recorded, Removal of old existing bank revetments, as well as increasing natural soils and plants for infiltration and treatment, will definitely improve water quality. The project will also remove extensive amounts of non-native vegetation, which will be replaced with native species.

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